## Spatio-temporal Variation in Air Quality and Unexpected Pollution Levels during Lamp Event over the Indo-Gangetic Plain in the First Wave of COVID-19 Pandemic

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## Supplementary material captions

SI Table 1. Daily average concentrations of pollutants and % change before and during P1 of lockdown.

SI Table 2. Pearson correlation coefficients (r) of mass concentration of  $PM_{2.5}$  with other toxic pollutants and meteorological parameters.

SI Figure 1: Figure 1: Change in community mobility before and during the nationwide COVID-19 lockdown (covering P1 of lockdown period as shaded region) over the selected cities in the study. Data Source: Google maps (https://www.google.com/covid19/mobility/)

SI Figure 2: Decreases in PM<sub>2.5</sub> concentrations prior and during first week of lockdown at 6 monitoring stations

SI Figure 3: Description of (a) Benzene, (b) Toluene, (c)  $NO_2$ , (d)  $SO_2$ , (e) CO and (f)  $O_3$  concentrations/emissions on prominent sites in U.P. (marked within the panel in different colours) during 1<sup>st</sup> March – 14<sup>th</sup> April, 2020. Clear declines in the emissions of different species are observed, except that of  $O_3$  which showed.

SI Figure 4: Trend analysis showing the effect of lockdown period and meteorological parameters on air quality at Agra – Sanjay Place monitoring station from 1<sup>st</sup> March to 14<sup>th</sup> April, 2020.

SI Figure 5: High resolution monitoring data (averaged over 15 min interval) of  $PM_{2.5}$  and benzene on April 5, 2020 at 5 monitoring stations. Yellow glow line was highlighted the Lamp event at 21:00 h.

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The comparison of the concentrations of various pollutants analysed in this study showed that the levels of almost all of the pollutants decreased during the lockdown period. The percentage decrease in the concentrations of all pollutants during P1 of lockdown as compared to the period before lockdown is tabulated in **SI Table 1**. The average levels of all the pollutants and meteorological parameters for the study periods i.e., before and during P1 of lockdown are shown in **SI Table 1**.

Stations	Study Period	PM <sub>2.5</sub> (μg/m <sup>3</sup> )	NO <sub>2</sub> (μg/m <sup>3</sup> )	SO <sub>2</sub> (μg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )	Ozone (μg/m <sup>3</sup> )	Benzene (µg/m <sup>3</sup> )	Toluene (μg/m <sup>3</sup> )
A	Before lockdown	55.6	50.0	26.5	1.1	6.5	3.1	7.9
	P1 of lockdown	42.6	45.4	26.7	1.0	13.1	2.4	2.7
	% Change	-23.4	-9.2	0.5	-11.2	102.9	-28.3	-65.4
G	Before lockdown	84.9	28.8	14.4	1.1	39.3	0.5	2.7
	P1 of lockdown	52.0	12.9	16.2	1.2	45.2	0.2	0.9
	% Change	-38.7	-55.0	12.3	3.1	15.0	-61.7	-63.3
L	Before lockdown	43.7	29.7	13.9	-	51.7	2.0	4.5
	P1 of lockdown	29.5	10.5	11.8	-	48.0	2.6	1.1
	% Change	-32.5	-64.8	-14.9	-	-7.0	29.6	-75.6
М	Before lockdown	56.0	20.7	10.9	1.2	16.5	0.5	1.3
	P1 of lockdown	41.8	11.1	10.3	1.12	18.8	0.4	0.6
	% Change	-25.3	-46.6	-5.6	-6.6	14.2	-24.6	-52.9
N	Before lockdown	66.6	53.2	13.9	2.4	48.8	0.4	5.9
	P1 of lockdown	37.7	15.9	14.3	1.7	60.5	0.2	1.8
	% Change	-43.4	-70.0	2.7	-29.8	24.0	-54.1	-69.4
V	Before lockdown	60.2	20.1	27.6	-	52.4	4.2	11.7
	P1 of lockdown	57.1	32.6	32.8	-	38.6	3.4	6.8
	% Change	-5.1	62.3	18.8	-	-26.3	-18.5	-42.1

SI Table 1. Daily average concentrations of pollutants and % change before and during P1 of lockdown.

	NO <sub>2</sub>	$SO_2$	СО	Ozone	Benzene	Toluene	RH	WS	SR	AT	PM <sub>2.5</sub>
NO <sub>2</sub>	1										
$SO_2$	.161*	1									
CO	.728**	0.019	1								
Ozone	0.003	0.104	0.132	1							
Benzene	.545**	-0.006	.715**	0.047	1						
Toluene	.477**	-0.06	.518**	-0.054	.544**	1					
RH	.606**	.167*	.496**	0.046	.637**	0.065	1				
WS	334**	188*	326**	-0.11	267**	0.012	458**	1			
SR	512**	-0.12	222**	-0.102	259**	-0.119	549**	0.063	1		
AT	573**	-0.147	352**	0.005	506**	-0.032	940**	.290**	.641**	1	
PM <sub>2.5</sub>	.442**	-0.032	.670**	-0.04	.837**	.252**	.729**	316**	-0.131	565**	1

SI Table 2. Pearson correlation coefficients (r) of mass concentration of PM<sub>2.5</sub> with other toxic pollutants and meteorological parameters

\*\*. Correlation is significant at the 0.01 level (2-tailed). \*. Correlation is significant at the 0.05 level (2-tailed).



Figure 1: Change in community mobility before and during the nationwide COVID-19 lockdown (covering P1 of lockdown period as shaded region) over the selected cities in the study. Data Source: Google maps (<u>https://www.google.com/covid19/mobility/</u>)



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Figure 5: High resolution monitoring data (averaged over 15 min interval) of PM<sub>2.5</sub> and benzene on April 5, 2020 at 5 monitoring stations. Yellow glow line was highlighted the Lamp event at 21:00 h.



Figure 6: Varimax Rotated Matrix Plot for air pollutants at 5 monitoring stations.